With the Medical Officer of Health's Compliments.

CARDIFF
PORT SANITARY AUTHORITY.

ANNUAL REPORT

FOR THE YEAR 1896,

BY

EDWARD WALFORD, M.D., D.P.H, Camb,

MEDICAL OFFICER OF HEALTH.

Printed by Order of the Sanitary Authority.

CARDIFF:
Lennox Brothers, Printers, 19, West Bute Street, Docks.

1897.

CARDIFF

PORT SANITARY AUTHORITY.

ANNUAL REPORT

FOR THE YEAR 1896,

BY

EDWARD WALFORD, M.D., D.P.H., Camb.,

MEDICAL OFFICER OF HEALTH.

Printed by Order of the Sanitary Authority.

CARDIFF:
Lennox Brothers, Printers, 19, West Bute Street, Docks.
—
1897.

Health and Port Sanitary Committee.

Mayor :

ALDERMAN E. BEAVAN, J.P.

Chairman :

ALDERMAN T. WINDSOR JACOBS, J.P.

ALDERMAN P. W. CAREY, J.P.	ALDERMAN RAMSDALE, J.P.
,, D. E. JONES, M.D., J.P.	COUNCILLOR R. HUGHES, J.P. *Deputy Chairman.*
COUNCILLOR T. ANDREWS, J.P.	,, C. A. J. WARD.
,, T. MOREL, J.P.	,, W. S. CROSSMAN.
,, J. JENKINS, J.P.	,, J. J. BUIST, M.B.
,, W. H. ALLEN.	

Medical Officer of Health's Department.

EDWARD WALFORD, M.D., D.P.H.

Chief Inspector of Nuisances :

DAVID JENKINS, Certificate Sanitary Institute.

Assistant Inspectors :

F. S. REES, Certificated Master Mariner.

S. J. HOLBOURN, Certificate Sanitary Institute.

Cardiff Port Sanitary Authority.

TOWN HALL,
CARDIFF.

TO THE CHAIRMAN AND MEMBERS OF THE CARDIFF PORT SANITARY AUTHORITY.

Gentlemen,—

I have the honour to submit to you my Annual Report for the year 1896.

The Port Sanitary District of Cardiff was constituted in the year 1882, by a Provisional Order of the Local Government Board, which was subsequently confirmed by Parliament.

In this Order the boundaries of the District are defined as follows:—

> "So much of the Port of Cardiff as lies between the River Rumney and "Lavernock Point; together with the waters of the said Port within "such limits, and the place for the time being appointed as the "Customs Boarding Station for such part of the said Port, and "every other place for the time being appointed for the mooring or "anchoring of ships for such part of the said Port, under any regu-"lations for the prevention of the spread of disease issued under "the authority of the Statutes in that behalf; and the watersides, "docks, basins, and creeks of and belonging to such part of the "said Port."

By a Provisional Order, dated 27th July, 1893, the limits of Jurisdiction of the Cardiff Port Sanitary Authority were extended, and on the 15th September, 1894, an Order of the Board was issued permanently constituting the Authority. This Order came into operation on the 9th November, 1894, and contains the following provisions:—

SECTION I.—CONSTITUTION OF PORT SANITARY AUTHORITY.

Article 1.—This Order shall come into operation on the Ninth day of November, One Thousand Eight Hundred and Ninety-four, unless it shall become Provisional, and until this Order comes into operation the said Order dated the Twenty-seventh day of July, One Thousand Eight Hundred and Ninety-Three, shall continue in force.

Article 2.—The Mayor, Aldermen, and Burgesses of the said Borough of Cardiff, acting by the Council, as the said Urban Sanitary Authority, shall be permanently constituted the Port Sanitary Authority for the part of the said Port of Cardiff, hereinafter described.

Article 3.—The Port Sanitary Authority may from time to time appoint committees consisting of Members of such Authority for the exercise of any powers which, in the opinion of such Authority, can be properly exercised by committees, but the acts of every such committee shall, unless otherwise directed by the Port Sanitary Authority, be submitted to such Authority for approval.

Provided that a committee so appointed shall in no case be authorised to borrow money or to issue any precept for contributions, or to enter into any contract, and it shall be subject to the provisions of Part IV. of the First Schedule to the Local Government Act, 1894, so far as they are applicable.

SECTION II.—LIMITS OF JURISDICTION.

Article 4.—The jurisdiction of the said Port Sanitary Authority shall extend to so much of the said Port of Cardiff as is comprised within the following lines, that is to say:

> A straight line drawn due south from the seaward extremity of the common boundary of the Parishes of Sully and Lavernock to the boundary of the said Port and a line following and coincident with the boundary of the said Port from its commencement at the River Rumney to the point at which the straight line firstly hereinbefore mentioned meets such boundary;

together with the water of the said Port of Cardiff within such limits, and the place or places for the time being appointed as the Customs Boarding Station or Stations for such part of the said Port, and every other place for the time being appointed for the mooring or anchoring of ships for such part of the said Port under any regulations for the prevention of the spread of diseases issued under the authority of the Statutes in that behalf, and the docks, basins, harbours, creeks, rivers, channels, roads, bays, and streams, belonging to such part of the said Port.

SECTION III.—ASSIGNMENT OF POWERS, &c.

Article 5.—For the purposes of this Order the following Sections of The Public Health Act, 1875, the Public Health (Officers) Act, 1884, the Public Health (Ships, &c.) Act, 1885, the Public Health (Members and Officers) Act, 1885, and the Public Health Acts Amendment Act, 1890, shall apply; and the Port Sanitary Authority shall have, exercise, perform, and be subject to, all the powers, rights, duties, capacities, liabilities, and obligations, of an Urban Sanitary Authority under the same Sections, so far as those Sections are applicable to waters within the jurisdiction of such Port Sanitary Authority, or to ships coming or being within the said jurisdiction, or to persons upon any such ship, or brought by any such ship within the said jurisdiction, or to goods or things upon any such ship, or to goods or things landed from any such ship, and being within the said jurisdiction, and which in the opinion of the said Authority or their Medical Officer of Health requires to be disinfected or distroyed; namely:—

Of the Public Health Act, 1875:—

- Section 70, relating to polluted water.
- Sections 91 to 111, both inclusive, relating to Nuisances.
- Sections 120 to 133, both inclusive, relating to Infectious Diseases and Hospitals.
- Sections 134 to 140, both inclusive, as to the prevention of Epidemic Diseases.
- Sections 141 and 142, relating to Mortuaries.
- Sections 173 and 174, relating to Contracts
- Sections 175, 176, and 177, relating to Purchase of Lands.
- Sections 179, 180, and 181, relating to Arbitration.
- Sections 182 to 186, both inclusive, and Section 188, relating to Bye-Laws.

Section 189 (except as regards the Offices of Surveyor and Collector), Sections 191 to 196, both inclusive, and Sections 197, 198, 205, and 206, relating to Officers and Conduct of Business of Local Authorities.

Sections 236 to 239, both inclusive, relating to Mortgages.

Sections 245, 247 (as amended by the District Auditors Act, 1879), 249, and 250, relating to Audit.

Sections 251, and 253 to 268, both inclusive, and Section 269 (as amended by the Summary Jurisdiction Act, 1884), relating to Legal Proceedings.

Section 278, relating to Settlement of Disputes as to Boundaries.

Sections 299 to 302, both inclusive, relating to defaulting Local Authorities.

Sections 305 to 310, both inclusive, relating to Miscellaneous Provisions.

Sections 327, 328, and 329, being Saving Clauses.

Of the Public Health (Officers) Act, 1884:—
Section 2.

Of the Public Health (Ships, etc.) Act, 1885:—
Section 2.

Of the Public Health (Members and Officers) Act, 1885:—
Section 2.

Of the Public Health Acts Amendment Act, 1890:—
Section 3, so far as it enables an Urban Sanitary Authority to adopt Section 48.

Provided as follows:—

(1.) Nothing herein contained shall affect the powers of any Riparian Authority except as to such waters, ships, persons, and things as above mentioned.

(2.) In this Article the term "ship" includes vessel or boat.

The regulations of the Local Government Board prescribe, with regard to the Medical Officer of Health:—

> "That he shall prepare an annual report, to be made to the end of "December in each year, comprising tabular statements so far as he "shall have been able to obtain the necessary information, of the "sickness and mortality of persons on ship-board within the District, "classified according to diseases, ages, and vessels, and a summary "of the action taken during the year for preventing the spread of "disease. The report shall also contain an account of the proceedings "in which he has taken part or advised under the Public Health Act, "1875, so far as such proceedings relate to conditions dangerous or "injurious to health, and also an account of the supervision exercised "by him, or on his advice, for sanitary purposes over places and "vessels that the Port Sanitary Authority has power to regulate, with "the nature and results of any proceedings which may have been so "required and taken in respect of the same during the year."

This report is therefore made in accordance with the above quoted regulations.

The Floating Population of the District is roughly estimated at 7,000 persons, and is contained for the most part in the following Docks :—

	West Bute Docks.	East Bute Dock.	Roath Dock.	Penarth Dock.	Penarth Tidal Harbour.	
Width of Sea Gate	45ft.	55ft.	60ft.	60½ft.		Width of Sea Gate
Basin	300ft. by 200ft.	380ft. by 250ft.	1,000ft. by 500ft.	400ft. by 330ft.		Basin
Lock	152ft. by 36ft.	220ft. by 55ft. Sea Lock. 200ft. by 50ft. Inner Lock.	350ft. by 80ft. Sea Lock. 600ft. by 80ft. Inner Lock.	270ft. by 60½ft.		Lock
Dock	4,000ft. by 200ft.	On North Side 4,350ft. by 500ft. On South Side by 300ft.	2,400ft. by 600ft.	2,100ft. by 370ft.	First Reach 4600ft. by 600ft. Total length 13,000ft.	Dock.
Depth of Water in Dock	19ft. & 13ft.	25ft.	26ft. & 36ft.	25ft. & 35ft.	First reach 30ft.	Depth of Water in Dock
Depth of Water on Sill (Spring Tide)	28ft. 8½in.	31ft. 8½in.	36ft.	35ft.		Depth of Water on Sill (Spring Tide)
Do. do. (Neap Tide)	18ft. 8½in.	22ft. 8½in.	26ft.	25ft.		Do. do. (Neap Tide)
No of Coal Staiths for shipment of coal	16	20	17	14	9	No. of Coal Staiths for shipment of coal
Water Area	17 Acres of Dock.	Basin, 3 Acres. Dock, 42 Acres.	Basin, 12 Acres. Dock, 33 Acres.	Basin, 3 Acres Dock, 18 ,, Inner, 5 ,,		Water Area

TABLE I.

YEARS.	Number of Vessels.		Total No. of Vessels Foreign and Coastwise.	Tonnage.		Total Tonnage. Foreign and Coastwise Inwards.
	Foreign.	Coastwise.		Foreign.	Coastwise.	
1847	933	5,787	6,420	77,164	367,804	444,968
1848	964	6,522	7,485	145,772	426,437	572,199
1849	1,182	6,166	7,344	182,981	397,892	580,373
1850	1,366	6,314	7,680	236,383	429,893	655,376
1951	1,387	6,490	7,877	260,916	449,753	710,669
1852	1,711	6,212	7,923	331,389	431,696	763,080
1853	2,113	6,200	8,313	428,403	447,836	876,239
1854	2,688	6,304	8,992	502,951	461,115	964,066
1855	2.720	5,662	8,382	607,136	415,781	1,022,817
1856	3,106	6,018	9,124	688,477	446,442	1,134,219
1857	3,082	6,256	9,388	752,366	453,009	1,205,345
1858	2.969	6,406	9,375	650,344	487,978	1,138,322
1859	3,274	6,888	10,262	786,118	548,631	1,334,749
1860	3.528	7,379	10,907	911,442	609,064	1,520.506
1861	3,603	7,933	11,536	879,778	675,355	1,555,133
1862	4,292	7,971	12,263	1,047,400	692.197	1.739,597
1863	4,622	7,715	12,337	1,135,090	684.009	1,819,099
1864	4,146	7,768	11,914	1,120,754	655,287	1,776,041
1865	3.879	7.678	11,557	1,127,560	662,723	1,780,283
1866	4,335	7,573	11,908	1,379,350	646,655	2,026,005
1867	4,466	7,397	11,863	1,456.110	630,438	2,086,548
1868	4,632	6,962	11,594	1,578,619	591.205	2,169.824
1869	4,808	6,995	11,803	1,689,580	607,185	2,385,755
1870	4,736	7,241	11,977	1,786,690	599,440	2,386,133
1871	4,234	6,919	11,153	1,637,725	588,611	2,225,736
1872	4,943	6,994	11,836	1,951,897	600.085	2,552,702
1873	4,694	6,674	11,368	1,920,410	640,089	2,560,499
1874	4,996	6,213	11.176	2,113,987	545,692	2,659,679
1875	4,645	5,541	10,186	1,947,265	493.818	2.441,083
1876	5,111	6,957	12,468	2,367,307	601,240	2,963.547
1877	5.625	6,661	12,286	2,542,210	586.773	3,128,983
1878	5.786	7,138	13,005	2,821,409	613,845	3,335,254
1879	5,761	6,958	12,719	2,944,565	635,613	3,580,178
1880	6,609	7,117	13,726	3,664,576	667,695	4,332,263
1881	5,592	6,853	12,845	3,672,019	705,105	4,377,124
1882	6,032	7,026	13,058	2,151,751	940,836	4,435,293
1883	6,195	7,260	13,455	4,322,849	797,722	5,116,571
1884	6,184	6,823	13,007	4,513,117	785,462	5,298,579
1885	5,990	6,719	12,709	4,563,662	849,512	5,413,174
1886	5.390	6,742	12,132	4,174,950	931,503	5,106,453
1887	5,925	6,531	12,456	4,714,247	919,898	5,634,145
1888	6.179	7,095	13,274	5,148,068	935,694	6,083,762
1889	6.339	7,411	13,750	5,476,773	918,666	6,458,439
1890	4,099	9,672	13,771	3,196.973	3,952,759	7,149,732
1891	4,308	10,415	14,723	3,445,139	4,116,831	7,561,970
1892	3,447	8,770	12,217	2,548,522	2,532,527	5,081,149
1893	3,140	8,861	12,001	2,470.396	2,608,690	5,779,086
1894	3,224	10,543	13,767	2,668,418	3,122,661	5,791,079
1895	3,166	10,150	13,316	2,686,874	2,944,071	5,630.945
1896	3,104	9,652	12,756	3,019,591	3,034,854	6,054,445

INFECTIOUS DISEASES IN THE PORT. — During the year Nine patients have been admitted into the Hospital for Infectious Diseases belonging to the Cardiff Urban Sanitary Authority. Subjoined is a statement of the cases and their issue :—

TABLE II.

DATE OF ADMITTANCE. 1896.	DISEASE.	CASES ADMITTED	RESULT.		
			RECOVERED.	DIED.	IN HOSPITAL AT CLOSE OF YEAR.
March 9.	Small Pox	2	2		
April 23.	Typhoid Fever	1	1		
Aug. 10.	,, ,, ...	1	1		
Oct. 19.	,, ,, ...	1		1	
,, 22.	,, ,, ...	1	1		
Nov. 14.	,, ,, ...	1	1		
,, 23.	Small Pox	1	1		
Dec. 24.	Small Pox	1	1		1
	Total	9	8	1	1

TABLE III.

The following table gives the number of vessels boarded during the year 1896, by the Medical of Health and Inspectors, on account of disease on board during the voyage, or at the time of arrival in Port:—

DATE. 1896.	TIME.	NAME OF SHIP.	NATIONALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
Jan. 31	4.40 p.m.	Marie Theresa	Italian	Sharpness	Malarial Fever	Vincenzo Vinegro, A.B., age 20 years, was medically attended on board suffering from Malarial Fever.
March 3	11.0 a.m.	s.s. Indra	British	London	General Debility, Bronchitis, etc.	On boarding this Steamer, 10 of the crew (Lascars) were reported ill. Medical treatment recommended.
March 9	2.0 p.m.	s.s. Knight Bachelor	British	Bombay *via* Marseilles	Small Pox	March 8th, 2.30 p.m., the Master came on shore from Penarth Roads and reported that two of the crew (Lascars) were ill on board, suffering from an Eruptive Fever. The vessel was boarded outside the Dock to prevent any person from going on board or on shore, and on arrival in Dock on March 9th, the two men referred to were removed to the Small-Pox Hospital. Forty-two of the crew were re-vaccinated, a large quantity of clothing and bedding destroyed, 62 chests of wearing apparel disinfected, and the Vessel fumigated. No other case occurred on board up to the day of sailing.
March 16	9.45 a.m.	s.s. Wennington Hall	British	Galveston *via* Havre	Beri Beri	
March 16	11.35 a.m.	s.s. Jeanara	British	Buenos Ayres *via* Dunkirk	Yellow Fever and Small Pox	The Master reported the death of Arthur Goodacre, apprentice, age 16 years, and Oliver Eaton, carpenter, age 32 years, from Yellow Fever, at Buenos Ayres, on January 2nd, both were buried on shore by the Authorities at the Port. John Roberts, steward, age 36 years, was also left in the Hospital at the Port suffering from Small-pox. The ship was placed in quarantine for 19 days, and fumigated several times, and the crew were vaccinated.

TABLE III.—*continued.*

DATE. 1896.	TIME.	NAME OF SHIP.	NATIONALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
March 17	8.45 a.m.	Saltram	British	Dublin	Liver Complaint	The Mate, George Weaver, aged 37 years, was reported ill on board. Medical treatment recommended.
March 17	12.45 p.m.	Duncrag	British	Rio & Australia *via* Havre	Yellow Fever and Consumption	Several cases of sickness and deaths were reported during the voyage between February 13th, 1894, and September 6th, 1895, viz :—Zachus Pyg, cook, aged 36 years, died on February 2nd, 1894, James Joss, A.B., age 23 years, and John Carruthers, apprentice, age 16 years, died on February 22nd and 26th respectively. All three died from Yellow Fever. John Selegmann, O.S., age 18 years, died at sea on March 13th. 1895, cause of death unknown. J. W. Wood, Master, age 31 years, died at Newcastle, N.S.W., on September 6th, 1895, from consumption. Effects of the deceased men were destroyed.
March 25	3.45 p.m.	s.s. Ethel Radcliffe	British	Black Sea *via* Rotterdam	Abcess	The Master reported that David Evans, First Engineer, age 30 years, was sent to Hospital at Constantinople, on February 17th, and died the same day from Abcess in the Stomach.
April 15	12 noon.	s.s. Horsa	British	Bombay, Rangoon, and Colombo (*via*) Hamburg	Small Pox	The Master reported that the ship arrived at Rangoon from Bombay on January 31st, 1896, sailed on February 14th, called at Colombo, February 20th, and sailed again February 21st, when James P. O'Donnell, Boatswain, age 26 years, was taken ill with pains in his body and vomiting, and he died on March 3rd from Small Pox, and was buried at sea. On arrival at Hamburg on March 28th, the effects of deceased and crew were taken on shore for disinfection, and the vessel was fumigated by the Authorities at that Port. No other case of sickness occurred.

TABLE III.—*continued.*

DATE 1896	TIME.	NAME OF SHIP.	NATIONALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
April 21	12.40 p.m.	s.s. Lundy	British	Rio (*via*) Buenos Ayres, St. Vincent, & Las Palmas	Malarial Fever	The Master reported that the ship left Rio on February 16th, 1896, and several of the crew were more or less ill on the passage to Buenos Ayres (at which Port the ship arrived on February 29th), suffering from Malarial Fever. No other case of sickness occurred, and the water tanks were emptied and cleaned at this port.
,, 23	9.30 a.m.	s.s. Bedouin	British	Bombay (*via*) Port Said, Genoa, and Marseilles	Small Pox	The Mate reported that the ship left Bombay on March 13th, and on the 24th, the Captain (Captain Godwin) was taken ill, and on arrival at Port Said on the 27th he was removed to Hospital suffering from Small Pox, taking his effects with him. The ship was disinfected at that Port, also at intermediate Ports, viz :—Genoa and Marseilles. No other cases of sickness occurred.
,, 23	6.35 p.m.	Assomption	French	Havre	Typhoid Fever	The Master reported that the ship left Havre on April 15th, and on the 22nd, R. Jean Marie, A.B., age 18 years, was taken ill with pains in limbs and head, and on arrival at Cardiff on the 22nd, was certified to be suffering from Typhoid Fever, and he was removed to the Sanatorium, taking his effects with him. The ship was disinfected at this Port. No other case of sickness occurred.
May 13	2.25 p.m.	Adelaide	Swedish	Santos (*via*) Barbadoes, Martinique, and Bordeaux	Yellow Fever	The Mate reported that the Steward and one A.B. were in Hospital for 10 days, suffering from Yellow Fever, whilst the ship was lying at Santos. They recovered and returned to the ship. No other case of sickness occurred, and the water tanks were cleansed out on the passage.

TABLE III.—*continued.*

DATE 1896	TIME.	NAME OF SHIP.	NATIONALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
May 18	9.30 a.m.	s.s. Kingsland	British	Brazils *(via)* Dunkirk and Antwerp	Typhoid Fever.	The Master reported that Neil Henriksen, A.B., age 38 years, died on April 14th, of Typhoid Fever, and was buried at sea on the passage from Brazils to Dunkirk. The ship was disinfected and part of deceased's effects at Dunkirk. The remainder of effects were disinfected at this Port, also water tanks were emptied and cleansed. No other case of sickness occurred.
,, 27	10.20 a.m.	Listo	Norwegian	Rio Grande *(via)* Pernambuco and Hamburg	Yellow and Malarial Fever.	The Mate reported that the ship was at Pernambuco for four months, and whilst there the First Mate L. Knudsen, and the Second Mate Thomas Larsen, died of Yellow Fever on July 25th and 28th, 1895, respectively, also several cases of Malarial Fever occurred amongst the crew. The effects of deceased were fumigated, also the ship.
June 8	9.35 a.m.	s.s. Wileysike	British	Rio *(via)* Buenos Ayres and Hamburg	Yellow Fever.	The Mate reported that William Stonehouse, Mess-room Steward, age 16 years, was taken ill on February 29th and sent to Hospital at Rio, suffering from Yellow Fever, and died on March 2nd. On March 2nd, John Page, First Engineer, age 33 years, was taken ill and sent to Hospital suffering from Yellow Fever. Ship left Rio on March 9th, and on the 11th James Brown, Third Engineer. age 23 years, was taken ill with Yellow Fever, and on arrival at Buenos Ayres, on the 17th, was sent to Hospital, and he recovered and rejoined the ship again on April 5th. The vessel and effects of deceased were disinfected. John Page also recovered and rejoined the ship again at Buenos Ayres, on March 29th.

TABLE III.—*continued.*

DATE 1896	TIME.	NAME OF SHIP.	NATIONALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
June 17	12.10 p.m.	Bankhall	British	Talcahuano	Dysentery	The Mate reported that A. Johnston, A.B., 45 years of age, was taken ill with Dysentery on January 26th, on the passage from Newcastle N.S.W. to Talcahuano, and on arrival at that Port on February 4th, he was sent to Hospital taking his effects with him. No other case of sickness occurred.
,, 22	2.45 p.m.	s.s. Mortlake	British	Buenos Ayres (*via*) Antwerp	Yellow Fever	The Mate reported the death of Charles Hicks, Second Engineer, age 26 years, from Yellow Fever at Buenos Ayres, on March 18th, and was buried on shore. All his effects were destroyed and the ship fumigated at that Port. No other case of sickness occurred.
,, 30	11.25 a.m.	Fratelli Gozollo	Italian	Buenos Ayres	Paralysis and Consumption	On boarding this ship, found that the Master had been ill on board since leaving Buenos Ayres on March 24th, and on arrival at Cardiff on June 30th, he was found to be suffering from Paralysis and consumption and died on July 3rd. His cabin was disinfected.
July 27	2.50 p.m.	s.s. Ninian Stuart	British	Newport (Mon.) (*via*) Smyrna and Taganrog	Small Pox	The Master reported that the ship arrived at Taganrog from Smyrna on June 25th, and on June 27th, Simon Timothy, fireman, age 38 years, was taken ill with pains in head and limbs, and on the 29th the Doctor certified that he was suffering from Small Pox, and was removed to Hospital there. His effects were destroyed and the ship fumigated several times by the Authorities at that Port. No other case of sickness occurred.
Aug. 10	11.40 a.m.	Emily Millington	British	London	Typhoid Fever	On boarding this vessel the Master reported that John Parkes, first mate, 45 years of age, was ill. Doctor examined him and certified that he was suffering from Typhoid Fever, and was removed to the Sanatorium the same day, taking his effects with him. The water tanks were emptied and cleansed and his berth disinfected by the Port Sanitary Authority at this port.

TABLE III.—*continued.*

DATE 1896.	TIME.	NAME OF SHIP.	NATIONALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
Sep. 30	10.30 a.m.	s.s. Wilderspool.	British	Calcutta (*via*) Hamburg.	Dysentery	The Master reported that the ship left Calcutta on August 1st, when Montague Quinn, fourth engineer, aged 21 years, was taken ill, suffering from Dysentery, died on August 8th and was buried at sea. The First Mate Herbert Fry, age 27 years was also left in Hospital at Hamburg, suffering from Dysentery. Rest of crew well.
,, 30	12.30 p.m.	s.s. Lydie	British	King's Lynn	Malarial Fever	The Master reported that Dom Gaffiero, boatswain, age 36 years, was sent to the Hamadryad Hospital Ship on arrival, suffering from Malarial Fever. Rest of crew well.
Oct. 5	3.15 p.m.	Sirena	British	Rio and Talcahuano *via* Queenstown.	Small Pox.	The Mate reported that George Washington, A.B., age 25 years, was taken ill with Small Pox at Rio, on August 28, 1895, and sent to hospital the following day. The vessel was disinfected several times in the course of the voyage, and effects of sick man destroyed. No other case of sickness occurred.
" 8	—	Juno	Russian	Riga	Typhoid Fever.	Edward Sarin, was admitted into the Hamadryad Hospital Ship on October 8th, from the Juno lying in Barry Dock, and he was certified on the 10th to be suffering from Typhoid Fever and was removed to the Cardiff Sanatorium. His effects were disinfected by the Sanitary Authority at this port.
,, 12	1.0 p.m.	s.s. Ashby	British	Sulina	Malarial Fever.	The Master reported that whilst at Sulina on September 1st, three members of the crew were taken ill, suffering from Malarial Fever and were sent to hospital there, recovered and returned to the ship, and all well on arrival at this Port.

TABLE III—*continued.*

DATE 1896	TIME.	NAME OF SHIP.	NATIONALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
Oct. 12	5.15 p.m.	Glendovey	British	Rosario	Typhoid Fever.	The Master reported that W. Edwards, O.S., age 19 years, was sent to hospital at Rosario on June 30th, suffering from Typhoid Fever. His berth and effects were disinfected and water tanks cleansed at this Port.
,, 14	10.30 p.m.	s.s. Blairmount	British	Old Calabar *via* Dunkirk and Rotterdam.	Malarial Fever.	The Master reported that George Grubb (late Captain), age 44 years, died from Malarial Fever, whilst on the passage from Old Calabar to Dunkirk and was buried at sea. No other case of sickness occurred.
,, ,,	—	s.s. Wingrove....	British	Sunderland.	Typhoid Fever.	William Kirby, fireman, age 30 years, was admitted into the Hamadryad Hospital Ship on October 14th from s.s. Wingrove lying in Barry Dock, and on the following day he was certified to be suffering from Typhoid Fever. He was taken to the Cardiff Sanatorium on the 19th, where he died. His effects were disinfected by the Sanitary Authority at this Port.
,, ,,	—	s.s. Sandhill	British	Bremerhaven....	Typhoid Fever	John Burgland, fireman, age 20 years, and Renold Hoffman, fireman, age 19 years, were admitted into the Hamadryad Hospital Ship, on October 14th, from s.s. Sandhill, lying in Barry Dock, and they were certified on the following day to be suffering from Typhoid Fever. Both men died there, and their effects were disinfected by the Sanitary Authority at this Port, and returned to the Board of Trade office.

TABLE III—*continued.*

DATE 1896	TIME.	NAME OF SHIP.	NATIONALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
Oct. 23	—	Bravo	Russian	Southampton....	Typhoid Fever	Information received to the effect that Albert Lipson, aged 16 years, died from Typhoid Fever whilst at Southampton. Effects of deceased on board were destroyed by fire at this Port by order of the Russian Consul.
,, 29	12.30 p.m.	s.s Twickenham	British	Rio *via* Leith	Yellow Fever....	The Master reported that C. Price, fireman, aged 39 years, was taken ill on May 8th whilst at sea, and was sent to hospital at Rio on May 26, suffering from Yellow Fever, and he died there. His effects were brought to this Port, and disinfected by the Port Sanitary Authority.
Nov. 12	3.30 p.m.	Sierra Miranda	British	Maritius, Rangoon, and St. Helens, *via* Queenstown and Hamburg	Malarial Fever and Beri Beri	The Captain reported that — Cranston, steward, age 43 years, was taken ill and sent to hospital at Rangoon on April 24th, suffering from Malarial Fever, and on arrival at Queenstown on Aug. 12, Captain McMasters, aged 43 years, was sent to hospital suffering from Beri Beri. All well on arrival at this Port.
,, 14	10.30 p.m.	s.s. King Edgar	British	Hamburg	Typhoid Fever	William F. Prentice, steward, age 26 years, was taken ill on Nov. 1st, and he was admitted into the Hamadryad Hospital Ship on Nov. 14th, and on the 16th was certified to be suffering from Typhoid Fever. His berth and effects were disinfected by the Sanitary Authority at this Port.

TABLE III—*continued.*

DATE 1896	TIME.	NAME OF SHIP.	NATIONALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
Nov. 17	—	s.s. Lydie	British	Black Sea *via* King's Lynn	Typhoid Fever	Dominique Gaffiero, boatswain, age 36 years, was admitted into the Hamadryad Hospital Ship on September 29th suffering from (supposed) Malarial Fever, and on October 29th was certified to be suffering from Typhoid Fever, and died on the following day. His effects were disinfected by the Sanitary Authority at this Port.
,, 23	9.30 a.m.	s.s. Corra Linn	British	Troon, *via* Charante, Santander, Troon and Charente (2 voyages)	Small Pox	The ship left Troon, October 14th, all well, arrived Charente, October 18th, left Charente October 22nd, arrived Santander October 23rd, all well, left Santander October 29th, arrived Troon November 3rd, left Troon again November 6th, when Patrick Brandon, Engineers' Mess-room Steward, age 18 years, was taken ill, and on arrival at Charente on November 10th, he was certified to be suffering from Small Pox. All the crew were vaccinated on November 13th, and on November 14th, Brandon was sent to Hospital there taking his effects with him. The ship was fumigated throughout and left Charente on November 14th, and arrived at Cardiff on November 19th. On the following day Captain Clements complained, and on the 23rd was also certified to be suffering from Small Pox, and was forthwith removed to the Cardiff Sanatorium, taking his effects with him. Ship was again fumigated at this Port. No other case of sickness occurred.

TABLE III.—*continued.*

DATE 1896	TIME.	NAME OF SHIP.	NATION-ALITY.	WHERE FROM.	NATURE OF SICKNESS.	REMARKS.
Dec. 2	11.0 a.m.	s.s. Morgan Richards....	British	Rufisg, *via* Bremerhaven	Malarial Fever	The Master reported that on arrival at Bremerhaven from Rufisg on November 16, J. Tingtred, A.B., age 31 years, G. McLeod, second engineer, age 29 years, and William Boyd, fireman, age 28 years, were sent to hospital suffering from Malarial Fever. All the rest of the crew well, but had suffered more or less during the voyage.
,, 4	9.0 p.m.	s.s. Ely Rise	British	Bilbao, *via* Barrow-in-Furness	Small Pox	Captain Davies had been suffering from Small Pox whilst the ship was at Bilbao, but recovered, and the ship was fumigated and part of the crew were vaccinated at Bilbao. No other case of sickness occurred.
,, 11	4.30 p.m.	s.s. Shelley	British	East Indies and China, *via* Rotterdam	Malarial Fever	The Master reported that several cases of Malarial Fever occurred amongst the crew whilst trading between the East Indies and China. All well on arrival at this Port.
,, 24	1.0 p.m.	s.s. Orianda	British	Trieste, Odessa, Malaga, and Garrucha, *via* Maryport	Small Pox	The ship arrived at Trieste on October 17th, sailed October 25th, arrived at Odessa November 2nd, sailed November 6th, arrived at Malaga November 22nd, sailed December 5th, arrived Garrucha December 6th, sailed December 8th, arrived Maryport December 18th. Robert McFarlane, steward, age 19 years, complained of being ill on the following day (19th). Sailed from Maryport on December 22nd, arrived Cardiff December 24th, when McFarlane was forthwith removed to the Sanatorium suffering from Small Pox, taking his effects with him. The vessel was fumigated, and a quantity of bedding, &c., destroyed by fire. Sixteen of the crew were vaccinated at this Port, and names and addresses of those leaving the ship were taken.

INSPECTION OF SHIPPING.—During the year 1896, 6,222 vessels were inspected, 5,271 were found in a fair or good condition, and 951 in a more or less defective or insanitary state. One hundred and sixty-five written notices were served and seven hundred and eighty-six verbal orders given.

The systematic inspection of shipping in the Bute and Penarth Docks, was efficiently performed by the Chief Inspector, David Jenkins, and by the Assistant Inspectors, S. J. Holbourn and F. S. Rees. The annexed tables will afford evidence of the useful work performed by the Officers of the Port Sanitary Authority, and will show that the inspection of Shipping in the port has resulted in a great improvement in the sanitary condition of the floating population.

The chief defects found on board ship were:—defective ventilation, impure water supply, defective bulk-heads, defective drainage or water closet accommodation. leaky decks, unlined iron decks, and direct communication between men's berths and waterclosets.

As a rule very little difficulty was experienced in obtaining compliance with the requirements of the Inspector. Shipowners and Masters willingly carry out the recommendations of the Port Sanitary Authority, with the result that the proportion of vessels having sanitary defects, amongst those which frequent this port, has decreased in a most marked manner.

It is only since the year 1889 that the provisions of the Public Health Act relating to nuisances have been carried out in a systematic manner by the Authority,

In June, 1889, an Inspector of Nuisances was first appointed to devote his whole time to the duties of his office, before this date the Chief Inspector of the Urban District was also the Inspector for the port, visiting vessels only on complaint or at the request of the officers of H.M. Customs. With regard to the detection of infectious diseases on board ships, this was relegated entirely to the Customs officers. The hospital accommodation of the Port District consisted of two wooden wards, which were administered from the Seaman's Hospital Ship. The Flat Holm Island was available for the reception of cases of Cholera, but there was no permanent hospital provision. At the present time, owing to the interest and energy displayed by your Port Sanitary Authority, the district over which it presides is fully equipped for ordinary purposes and emergencies. Three Inspectors are attached to the district, two holding the Certificate of the Sanitary Institute and one that of a Master Mariner. They thoroughly understand their work and carry it out in a most satisfactory manner. An office at a convenient situation at the Docks has been provided, which greatly facilitates their work. This is in telephonic communication with the Town Hall and with the Telephone Exchange.

The amount and character of the ordinary work of the Inspectors may be judged by the fact that since it was commenced in 1889, 32,997 vessels have been inspected, out of which 14·5 per cent. were found with sanitary defects.

The ordinary infectious diseases which are brought into the port are dealt with in the new hospital belonging to the Urban Authority, which is within the boundaries of the Borough. Extra provision is provided for the isolation of persons who may be brought into the port suffering from diseases which do not occur in England, unless imported from abroad. Apart from other reasons, from a commercial point of view, it is desirable that diseases of this kind should if possible be removed from vessels before they enter the docks. The Flat Holm Island forms a convenient place of isolation in such cases. In future therefore, cases of Cholera Yellow Fever, or Plague, will be removed from vessels to your hospital which has just been completed on this island.

The method of disposal of the bodies of persons dying in this hospital or on board any vessel detained under the Cholera Regulations at the mooring station, has received the careful consideration of your Authority, and a suitable and well arranged apparatus for the cremation of such bodies has been erected on the Island. Satisfactory arrangements have been made with the adjoining Barry Port Sanitary Authority for the reception into your hospital of patients brought into their district from abroad, and also with the Bristol and Gloucester Authorities for the cremation of the bodies of any persons who may die of Cholera in their districts.

The following table shows the number of vessels, foreign and coastwise, inspected during the year :—

TABLE IV.

		Number Inspected.	Number Defective.	Number of Orders Issued.
Foreign	Steam-ships	1,946	324	324
	Sailing-ships	633	143	143
	Fishing	....	....	....
		2,579	467	467
Coastwise	Steam-ships	2,246	287	287
	Sailing-ships	1,393	197	197
	Fishing	4	....	....
		3,643	484	484
Total Foreign and Coastwise ...		6,222	951	951

The following Table shows the number and nationality of the Vessels inspected :—

TABLE V.

NATIONALITY.	STEAM.	SAIL.	TOTAL STEAM AND SAIL.
American	....	4	4
Argentine	1	2	3
Austrian	29	3	32
Belgian	9	....	9
British	3,668	1,407	5,075
British American	....	24	24
Danish	11	22	33
Dutch	19	7	26
French	161	150	311
German	67	42	109
Greek	51	....	51
Italian	14	34	48
Norwegian	100	245	345
Portuguese	7	3	10
Russian	2	41	43
Spanish	33	24	57
Swedish	27	15	42
Totals	4,199	2,023	6,222

During the year the forecastles, berths, water-closets, etc., in 430 British ships and 131 Foreign ships, respectively, have either been cleansed, painted or limewashed.

They are of the following nationalities :—

Austrian	3
Belgian	1
British	430
British American	7
Danish	3
French	63
German	8
Greek	7
Italian	10
Norwegian	16
Russian	1
Spanish	11
Swedish	1
Total	561

The structural defects included the following :—

Defects	Cases	Remedied
Defective ventilation to deck water-closets	80	70
,, stoves and funnels in crew's spaces	43	41
,, side ports in crew's spaces	148	143
,, or unlined iron decks over berths	17	15
,, ventilation and ventilators in crew's spaces	43	39
,, bulkheads and floors in crew's spaces	36	28
,, cable casings in crew's spaces	18	16
,, lighting	55	40
,, water-closets	48	38
,, drainage	21	18
,, and dirty water-casks and tanks	44	42
Ship's stores kept in crew's spaces	87	78
Leaky decks over berths	51	40
Foul bilges and peaks	31	30
Foul accumulations of dirt	48	47
Paint lockers adjoining and ventilating into crew's spaces	12	12
Totals	782	697

LEGAL PROCEEDINGS.

April 4th.—A summons was issued against Captain Johannesen, of the Swedish vessel "Ornen," for non-compliance with an order of the Port Sanitary Authority to remedy certain sanitary defects on his vessel, but was withdrawn on April 22nd, the Captain promising to do the necessary work, which was done.

June 1st.—Proceedings were taken against Captain Madec, of the French vessel "Hebe," of Auray, for non-compliance with an order of the Port Sanitary Authority to abate a nuisance and remedy certain sanitary defects on his vessel. A conviction was obtained, and the Master was fined £2 and costs or 21 days imprisonment. The fine was paid.

July 10th.—A summons was issued against Captain Parentheon, of the French vessel "Graziellina," of Treguier, for non-compliance with an order of the Port Sanitary Authority to remedy certain sanitary defects on his vessel, but was withdrawn, the Captain promising to do the necessary work, which was done.

December 8th.—Proceedings were taken against Captain Chenio, of the French vessel "Alcide," of Nantes, for non-compliance with an order of the Port Sanitary Authority to abate a nuisance and remedy certain sanitary defects on his vessel. An order was made to complete the work within three days and was complied with.

December 12th.—Proceedings were taken against Captain Perrodo, of the French vessel "Emilie" of Redon, for non-compliance with an Order of the Port Sanitary Authority to abate a nuisance and remedy certain sanitary defects on his vessel. An order was made to complete the work in three days and was complied with.

Articles of Food found on board ship and certified by the Medical Officer of Health as unfit for human consumption and destroyed, viz.:—380 lbs. of beef.

ABOLITION OF QUARANTINE.—The Public Health Act, 1896, which became law on the 7th of August, repeals all the enactments relating to quarantine in the Quarantine Act, 1825.

The Act of 1896 makes further provision with respect to Epidemic, Endemic, and Infectious Diseases, and gives power to amend regulations made under Section 130 of the Public Health Act, 1875, (Cholera Regulations).

Under the old Quarantine Act, two diseases were nominally dealt with entirely by the Officers of H.M. Customs, namely, Yellow Fever and Plague, and the ancient system of quarantine was supposed to apply to these cases.

This fiction has now been dispelled and the responsibility of dealing with these diseases has been officially cast upon the Sanitary Authorities of the various Port and Riparian Districts in the Kingdom.

Under the powers of the above-named Acts, the Local Government Board have repealed the Cholera Regulations dated respectively the 28th August, 1890, and the 6th September, 1892, and have issued a General Order dated 9th November, 1896, making regulations which deal with Cholera, Yellow Fever, and Plague.

They are very similar to those issued with regard to Cholera alone.

All three diseases will in future be dealt with in exactly the same manner under the extended powers given by these Regulations,

Should a ship infected with either Cholera, Yellow Fever, or Plague, reach this Port, it may be detained either by the Medical Officer of Health or by an Officer of Customs, and no person would be allowed to leave it until every person on board has been examined by the Health Officer who certifies to the Master and to the Sanitary Authority that the ship is infected. The Master is therefore required to place his ship at the mooring station, fixed under Article 6 of the Order near the Flat Holm Island, and every person certified to be suffering from any of the abovementioned diseases is to be removed to the Hospital of the Port Sanitary Authority on the Flat Holm.

Stringent regulations are laid down as to the disinfection of the ship and of any bedding or clothing or infected articles under the directions of the Medical Officer of Health. The process must be completed at the mooring station before the vessel enters the Docks, after which the detention of the vessel ceases, but no person is permitted to land unless he satisfy the Medical Officer of Health as to his name, intended place of destination, and intended address at such place.

Such name, intended place of destination and address are given by the Medical Officer of Health to the Clerk to the Sanitary Authority, and the Clerk transmits the same to the Local Authority of the district in which the place of destination is situate.

Powers are given to direct bilge water and ballast water to be pumped out if necessary and provide the vessel with a proper supply of drinking water, and lastly every ship with Cholera, Yellow Fever or plague on board must fly a flag of yellow and black borne quarterly, and must keep the same displayed between sunrise and sunset.

During the year the Port Sanitary Authority made fresh regulations dealing with the ordinary Infectious Diseases pursuant to Section 125 of the Public Health Act, 1875. These regulations received the sanction of the Local Government Board on the 24th February, 1896.

Fresh regulations were necessary in consequence of the alteration of the boundaries of the Port Sanitary Authority.

They differ from the former ones in giving increased powers of detention in the case of vessels having on board a person suffering from an infectious disease.

The Master or person in charge is now required to stop his vessel on arrival off the Customs boarding station, and to cause her to remain there until the Medical Officer of Health has boarded her.

On the 21st December, 1896, the Local Government Board issued an order rescinding their General Orders dated the 5th August and the 13th September, 1893, with reference to the importation into England and Wales from certain foreign parts of dirty bedding or disused or filthy clothing as defined in their orders.

The new regulations in the General Order dated 9th September, 1896, give sufficient powers for dealing with those things in the case of all articles infected or likely to retain infection.

I have to report that your new hospital on the Flat Holm Island is now ready for occupation, and that it contains all the accommodation which is likely to be required at this Port. It is fitted with the most recent and efficient appliances, a new laundry, a mortuary and a crematorium for the disposal of the dead, are in connection with it.

I am, Gentlemen,
Your obedient Servant
EDWARD WALFORD, M.D.,
Medical Officer of Health.

IMPORTATION OF FROZEN MEAT.

During the year 1896, the undermentioned quantity of Frozen Meat has been landed at this Port.

TABLE VI.

Date. 1896.	Name of Ship.	Where From.	Mutton.				Beef.			Lambs.	Tongues.
			Carcases.	Half Carcases.	Hind Legs.	Hind Quarters.	Quarters.	Hind Quarters.	Sides.		
Jan. 6.	s.s. Zephyrus	River Plate via Liverpool	4,000								
,, 24.	s.s. Zenobia	River Plate via Liverpool	2,000								
Feb. 1.	s.s. Hornby Grange	River Plate via London and Liverpool	3,000				4,000				
,, 14.	s.s. Zarate	River Plate via Liverpool	4,000								
April 1.	s.s. Zephyrus	River Plate via Liverpool	5,000								
,, 1.	s.s. Ovingdean Grange	River Plate via London and Liverpool	9,313	999	300	5,992	720			678	
May 13.	s.s. Hornby Grange	River Plate via London and Liverpool	10,000			8,000		500			
,, 18.	s.s. Zarate	River Plate via Liverpool	3,300								
June 4.	s.s. Portena	Buenos Ayres	10,000								
,, 25.	s.s. Zephyrus	River Plate via Liverpool	2,682								
July 17.	s.s. Zenobia	River Plate via Liverpool	2,425				18				
Aug. 7.	s.s. Pampa	Buenos Ayres	6,000			3,500		250		2,000	
,, 17.	s.s. Zarate	River Plate via Liverpool	3,300								
,, 27.	s.s. Ovingdean Grange	River Plate via Liverpool	600			3,000			500		60
Oct. 5.	s.s. Hornby Grange	River Plate via Liverpool	18,000								
,, 30.	s.s. Zenobia	River Plate via Liverpool	2,800								
Dec. 1.	s.s. Zarate	River Plate via Liverpool	18,000								
,, 14	s.s. Ovingdean Grange	River Plate via Liverpool	13,589			2,539	600				
		Totals	118,009	999	300	23,031	5,338	750	500	2,678	60

COUNTY BOROUGH OF CARDIFF.

REPORT

OF THE

MEDICAL OFFICER OF HEALTH

ON

SEWER VENTILATION.

CARDIFF:
GEO. W. LENNOX, PRINTER, ATLAS CHAMBERS, JAMES STREET, DOCKS.

1896.

COUNTY BOROUGH OF CARDIFF.

REPORT

OF THE

MEDICAL OFFICER OF HEALTH

ON

SEWER VENTILATION.

CARDIFF:
GEO. W. LENNOX, PRINTER, ATLAS CHAMBERS, JAMES STREET, DOCKS.

1896.

REPORT of the Medical Officer of Health on
SEWER VENTILATION.

Town Hall, Cardiff,
December 8th, 1896.

To the CHAIRMAN and MEMBERS of the HEALTH AND PORT SANITARY COMMITTEE.

Gentlemen,

In accordance with the instructions of your Committee, I beg to present to you my report on "Sewer Ventilation."

I have as far as possible confined my remarks to that part of the subject which bears most closely upon Public Health, and have necessarily omitted technical engineering details, upon which I am unqualified to give an opinion.

It may be assumed that under ordinary circumstances the ventilation of sewers is necessary, and that in districts where no efficient provision is made for ventilation evil effects are likely to arise. Putting aside those instances of sudden death in the case of workmen employed in sewers, due to Asphyxia from inhaling the gaseous products of sewage decomposition in a concentrated form, in old and foul sewers of deposit, it is well known that the continuous breathing of air polluted with the emanations from sewers has an injurious effect upon the health of those who are subject to it. It is also probable that besides the general ill health which may be caused in this way, the infectious matters thrown off from certain specific diseases may enter the sewers and be either the direct or indirect means of conveying to the community the contagion of such disease. It has been proved that infectious diseases are associated with the growth and multiplication in the system of specific micro-organisms or minute and low forms of vegetable life, and in regard to some of them the proof is complete that these organisms are the actual contagia or cause of disease, and in regard to others that their development in the system results in the formation of poisonous substances which may in these cases be regarded as the immediate cause of the disease. These micro-organisms or poisons when cast off as waste products from the bodies of persons suffering from disease, may pass into sewers and become a source of danger in their underground travels through the district. Fortunately most of the disease producing germs are soon destroyed by exposure to light and air, hence the advantage of freely diluting the air of sewers with pure fresh atmospheric air.

It is probable that the spread of infectious disease by means of sewers would be much more frequent than it is were it not for the fact that the micro-organisms are solid particles and not volatile, they cannot easily rise in the air from moist substances, but when dry they may be freely blown about as dust and contaminate air, food, and water, or they may under exceptional circumstances be lifted into the air with gas bubbles. The sewers however must be in an unusually bad condition for such excessive evolution of gas to take place.

Dr. J. B. Russell, the able and distinguished Medical Officer of Health for Glasgow, states that "microbes are rarely liberated from the liquids which contain them, and that moist substances or surfaces may be loaded with them, but mere evaporation will not raise them into the air," and further "that he has no fear that any sort of disease producing microbe after it once reached the sewer will ever turn up again alive." Dr. Russell of course excludes those cases in which the sewers discharge into potable rivers and where drains leak into local wells, otherwise he says "that for pathogenic microbes the sewer is the broad road which leads to destruction."

Generally the air of an ordinary well-constructed sewer is much less impure than one would expect. Chemically the chief difference is in the higher proportion of Carbonic Acid and volatile organic matters. The proportion of micro-organisms may even be less than in the outside air, from whence indeed they are mostly derived.

Investigations on this subject have been made by Drs. Carnelly and Haldane, in connection with the main sewer of Westminster Palace, and with various sewers in Dundee where ventilation is carried out by means of open gratings placed in the roadway. The general conclusions were as follows:—

(1.) The CO_2 was about twice, and the organic matter about three times as great as in the outside air at the same time.

(2.) The number of micro-organisms was less in sewer air than in the outside air at the same time.

More recently, in 1893, a report has been presented to the London County Council by Mr. J. Parry Laws, F.J.C., in which he states that the results of his experiments on the London Sewers point unmistakably to the conclusions that the principal, if not the only source of micro-organisms in sewer air, is the air without the sewer and not the sewage, and they also tend to prove that there is very little ground for supposing that the micro-organisms of sewage, in the absence of violent splashing, become disseminated in the sewer air. The experiments shewed that the micro-organisms in the sewer air are related in kind to those in the outer air and not to those in the sewage, and further that there was a complete absence in the sewer air of those forms of microbes which are discharged from the human body either in health or in disease, and which are present in enormous numbers in the sewage itself.

In a further report to the Council Mr. Laws and Dr. Andrewes state that in the London sewers they were unable to find either the bacillus of typhoid fever or the bacillus of diphtheria, two diseases which have been freely attributed to sewer air and to the pollution of water with sewerage. They subsequently searched in a drain from the typhoid block of the East London Fever Hospital at Homerton and found in the sewage bacilli of typhoid fever when for the purposes of the experiment the ordinary disinfection of the excreta had been suspended. A week or two later however they examined the sewage about a quarter of a mile from the hospital but failed to find any of the bacilli. Messrs. Laws and Andrewes conclude their report by stating that "It seems clear that sewage does not form a medium in which much if any growth of typhoid bacilli is possible under natural conditions, and that their death is probably only a matter of a few days or at most one or two weeks. That sewage is a common medium for the dissemination of typhoid fever is certain; that sewage polluted soil may give up germs to sub-soil air is possible; but that the air of sewers themselves should play any part in the conveyance of typhoid fever appears to us, as the result of our investigations, in the highest degree unlikely."

In the Annual Report of the Medical Officer of the Local Government Board, for 1894-95, it is pointed out however by Dr. Klein, in reference to the investigations of Messrs. Laws and Andrewes, that the typhoid bacillus multiplies abundantly and retains its vitality for a long time when nitrates are present in the fluid which is used for the artificial culture of the bacillus, and that these salts would in all probability be present in the soil through which, under natural conditions, the sewage might percolate, and in the water which was polluted with sewage. Dr. Thorne-Thorne, the Chief Medical Officer of the Board, in alluding to Dr. Klein's experiments, states "that he has conclusively shown that the belief in the inability of the typhoid bacillus to thrive in sewage has no sufficient basis in fact." Whatever conclusions may be drawn from the observations of Messrs. Laws and Andrewes, or from those of Messrs. Carnelly and Haldane, it is clear that Sanitary Authorities have still imposed upon them the duty of keeping their sewers in such a state as not to be a nuisance or in any way injurious to health. For even supposing that such diseases as typhoid fever and diphtheria cannot be directly connected with the inhalation of sewer gas, it may with confidence be asserted that a predisposition to take such diseases is produced thereby, and that chronic poisoning characterized by nausea, diarrhœa, and general prostration may be caused in the same way. Attacks of acute illness, especially in the puerperal state, or in persons who have recently undergone surgical operations, are under such circumstances by no means rare, for it must not be assumed that because observers have failed to detect in sewer air certain pathogenic organisms this air is therefore harmless. In any case noxious chemical substances are evolved varying in nature with the condition of the sewer, which produce ill effects, although not necessarily any of the ordinary infectious diseases. The speedy removal of sewage from dwellings and its discharge in some harmless manner at an outfall far away from the population, is the essential feature of a good system of sewerage, and without which the health of the community will undoubtedly suffer.

The movement of air in sewers when no artificial means of ventilation are used, depends upon the physical properties which are common to atmospheric air and gases in general. Air has weight and is acted upon like other bodies by the force of gravity, and its movements are due to the difference of weight of adjacent and equal volumes, the difference of weight depending upon the temperature and pressure to which each volume of air is subject and the proportion of watery vapour which it contains. The movement is also very largely dependent upon the force and direction of the wind, which acts either by inducing a vacuum in the sewer or by blowing directly into any opening in it. In summer the temperature of the sewer air is generally lower and in winter higher than that of the outer air. Any sudden variation either in the temperature of the air or in the barometrical pressure producing corresponding expansion or contraction in the air in the sewer. With a falling barometer it will expand and have a tendency to rise out of the street gratings. Although therefore the laws which govern the movement of air and gases are well understood, the conditions which exist in a system of sewers are sometimes so complex that ventilation becomes a matter of no small difficulty. The difficulties appear to be so insurmountable that in some places there is a tendency to follow the example of Bristol and to abandon sewer ventilation altogether, especially as in this city no evil consequences seem to have resulted from its absence. The whole question is probably more one of designing sewers with self-cleansing gradients and velocities than one of ventilation. When offensive smells arise from a sewer it is generally a sign that the sewer is one of deposit and that it is not self cleansing. It is for Engineers to discover and remedy the cause of the evil. Closing a street ventilator or erecting a tall shaft may do away with the obvious nuisance, but it will not improve the condition of things in the sewer, such a proceeding may indeed tend to perpetuate the real danger by withdrawing attention from the defect. If sewers are well constructed and have suitable gradients, and are at all points thoroughly and systematically flushed, the ventilation is really a matter of minor importance, provided of course that house drains are properly disconnected from the sewer. Unfortunately these favourable conditions seldom exist in practice, and in most places therefore sewer ventilation cannot be abandoned. In times of drought in the summer, when the sewers require an unusual amount of flushing, they are deprived of the natural means of cleansing by the absence of rainfall, and at the same time a scarcity of the public water supply may seriously interfere with the ordinary flushing arrangements.

The ventilation of public sewers is of course entirely independent of the ventilation of private house drains. In the former case the Sanitary Authority is responsible, in the latter the owner of the property, who may however be controlled in this matter by bye-laws. All house drains should be disconnected from the sewer in such a manner that it is impossible for the air from the sewer to enter the house. This is effected by the insertion of a trap in the drain as near as possible to the point of its connection with the sewer, by ventilating the drain on the house side of this trap, and by continuing the soil pipe in its full diameter above the level of the roof of the house. By this means the fresh air entering by the ventilator near the trap, passes along the whole drain and issues from the top of the soil pipe, a current of fresh air is thus constantly circulating through the house drain. Full details of this method are contained in a recent report presented to you by your Borough Engineer. Sewer ventilation as first practised was carried out in an irregular and unintentional manner by means of untrapped rain water pipes or other pipes connected with the house drainage. Subsequently, to relieve the pressure of air in the sewers, open gratings at the street level, connected with manholes, were introduced, and these have now become the usual means of ventilating sewers. The system of vertical shafts, usually manholes, opening in the roadway and leading directly to the crown of the sewer beneath, is the one which is adopted in Cardiff. Mr. Harpur, M.I.C.E., the Borough Engineer, informs me that the ventilators are placed at about 75 yards apart in the greater part of the district. In some very few instances the consent of the owner of a building has been obtained to erect a high iron ventilating shaft against his premises. Sir Robert Rawlinson advises in connection with ventilators opening at the street level, "that they should be provided for on all sewers at frequent intervals not greater than 100 yards apart," and adds the very suggestive remark "if however it is found that some of the ventilators are a nuisance, additional sewer ventilation should be provided at shorter intervals." There are I believe few towns in which the nuisance from ventilators at the surface of the street has not been at times complained of. The replies to my enquiries, which are appended to this report, fully bear out this statement. Granting that these complaints are by no means without foundation, it must be acknowledged that the danger to health would be much greater if this ventilation were abandoned. The discharge of gases from the sewer into the middle of the road, as far as possible from dwellings and where they are freely diluted with fresh air, is much less dangerous than the discharge of such gases through house drains or street gullies near the footpath, which must of necessity take place if the sewer is imperfectly ventilated, or if from any other cause the pressure of air in the sewer is largely increased. If the openings into the crowns of sewers be sufficiently numerous, there cannot be at any time pressure enough to force the traps on house drains or street gullies.

The road ventilators will at times act as outlets for sewer gas and at other times as inlets for fresh air, this depending upon a variety of causes, such as barometrical pressure, direction and force of the wind, and the relation between the temperature in the sewer and that of the external air. Sewers discharging into the sea or into tidal rivers, as in Cardiff, are liable to be tide-locked periodically. During this period, as they fill up with sewage, sewer air will be expelled, and when the sewers discharge on the ebb tide, fresh air will be drawn in at the openings in the sewer. In consequence of these conditions any system of up-cast or down-cast shafts which may be arranged for the purpose of producing a current of air will be entirely ineffectual, as all shafts will act as upcast shafts when the sewers are tide-locked and the sewage is being backed up in them, and as downcast shafts when the sewage is discharging. Various methods have from time to time been suggested with a view of preventing the nuisance from ventilators, none of which however have been at all generally adopted. Amongst these may be mentioned the following :—

(1.) Sewers have been connected with furnace chimneys, but although a great velocity in the sewer air has been produced, this effect has been only for a short distance from the furnace, as the external air rushes through the nearest street openings, or possibly traps may become unsealed in order to supply air for the furnace, the air in the sewer at a distance from the furnace remaining more stagnant than if no such system had been adopted. This was proved by experiments on a large scale made in 1888 by Sir Joseph Bazalgette upon the London sewers at Westminster, where a furnace was connected with a large up-cast shaft. Speaking of these experiments Sir Joseph Bazalgette says, "A furnace ventilating any large district would require to produce a very large volume of air and to keep up a velocity sufficient to ventilate the branch sewers, and the drag would be so great through the main that it would force open any house drain traps or water traps we could form before it would influence the remote branches." The results of these experiments have been confirmed by subsequent observations.

(2.) In some towns ventilating pipes have been carried from the drain on the sewer side of the disconnecting trap to the top of the house, the gratings at the street level being closed on complaint of nuisance. This may possibly remove an obvious nuisance from one locality but the result of such a system would be a partial and incomplete ventilation. If the street gratings were allowed to remain open this system of pipes would probably be an excellent way of ventilating the sewer. The gratings under these circumstances would generally act as inlets and the high pipes as outlets. At times, in the summer or under certain conditions of the atmosphere, the current of air might be reversed, but we should then be in no worse position than we are at present. Unfortunately the practical application of this plan is surrounded with difficulties; its success depends upon its general adoption, and in each case the consent of the owner is required to the erection of a ventilating shaft on his premises. This consent can rarely be obtained.

(3.) Baskets filled with charcoal were formerly placed in the manholes for the purpose of removing the smell from the ventilators, but it was soon found that unless they were frequently renewed they were worse than useless, they became wet and clogged and obstructed the ventilation. They have now been nearly everywhere abandoned.

(4.) Mr. G. F. Harrington, of Ryde, introduced a system of ventilating sewers by making provision for the entry of air into the sewers by means of a shaft with a revolving cowl at its upper end so arranged that its mouth is always presented to the wind. Air will enter through the cowl and descend through the shaft to the sewer, to be extracted at a distance varying from 300 to 500 feet, by a shaft which terminates above in an open end. Professor Corfield, from whose work on the "Treatment of Sewage" this information is obtained, states that this system was tried as an experiment on some of the sewers belonging to the Chelsea Vestry with good results.

(5.) It has been proposed to put a large ventilating shaft at the head of every sewer, either in lieu of or in addition to the openings at the street level, but it appears that when the street openings are closed the amount of sewer air passing through the shaft is quite insufficient to ventilate the sewer, and that when they remain open the ventilation extends to a very short distance beyond the nearest ventilator in the road.

(6.) Recently the principle of the " Destructor " has been applied to sewer gas. " The Keeling-Holman Sewer Gas Exhauster and Destructor " has in some places been adopted with the intention of destroying sewer gas and any injurious matter which it may contain. The system, which has been introduced at Ealing, Richmond, Winchester, and Reading, is an arrangement of lamp columns with a 6-inch connexion from the sewer for passing sewer air through an atmospheric gas-burner fixed in the base of the column, the outlet being about 10 feet above ground, under an ordinary street lamp placed at the top of the column. It is stated that by a consumption of 8 cubic feet of gas every hour, 2,500 to 3,000 cubic feet of sewer air can be extracted per hour. These destructors have not yet been adopted on a sufficiently extensive scale to enable a reliable opinion to be given as to their efficacy. Dr. Hill, Medical Officer of Health for Birmingham, states as his experience that they are expensive without being efficient.

The inquiries which I have addressed to the Medical Officers of Health of various towns were directed to the following points relating to sewer ventilation :—

(1.) The method of ventilation adopted.

(2.) Whether the method was approved by the Health Officer ?

(3.) Whether complaints of nuisance from ventilators were numerous ?

(4.) Whether there was reason to suppose that illness had been caused by the system adopted ?

The full replies which I obtained are appended to this report, but for convenience of reference I submit for your consideration the following summary :—

Out of 45 towns from which replies were received, there were 18 in which the sewers were ventilated entirely by ventilators opening at the street level. In 8 of these towns this system was approved by the Medical Officer of Health. In 7 there was a decided disapproval and in the remainder the approval was qualified. In 24 of the towns the ventilators opening at street level were supplemented by pipes carried above houses and in a few cases connected with factory chimneys. To this system there is an unqualified approval on the part of the Medical Officers of Health in 6 towns. In 5 towns the pipes carried above houses are approved of but not the ventilators at street level. In 6 this system is approved, but the manner in which it is carried out is objected to on the ground of an insufficient number of pipes. Altogether out of 45 towns there were 42 in which there were ventilators opening at the street level, and in 21 of these the complaints of nuisance were stated to be numerous and in 16 not numerous. In the remainder the complaints were confined to particular districts in the warm weather. In 2 towns the sewers were ventilated by means of cast iron pipes carried from 30 to 80 feet high, and without any street ventilators. Bristol is the only town of any size in which the sewers are not ventilated at all, and this system is approved by the Medical Officer of Health and City Engineer who desire no change. To the question whether there was reason to connect illness with the system of ventilation adopted, the replies were only definitely in the affirmative in 6 instances. In 11 towns the Medical Officer of Health had some reason to suspect that illness had been caused by the street ventilators. In the remaining 28 there was no reason to connect illness with the ventilators.

After a careful consideration of the facts which I have been able to collect, I believe that there is very little reliable evidence to show that the ordinary specific infectious diseases are caused by inhaling sewer gas, and that usually where sewage is responsible for their causation the mischief has arisen through swallowing either water or food which has become contaminated with sewage matters. My own experience is certainly in the same direction. In Cardiff, during the past few years, typhoid fever has been of comparatively infrequent occurrence, and the only extensive outbreak of this disease since 1888 was certainly due to the milk supply in a particular locality having become polluted on the premises of a milk vendor. The cases of fever, some 40 in number, occurring within a very short time, were entirely confined to the consumers of milk from this one source, and the outbreak immediately ceased on the sale of this milk being stopped. The vital statistics of this and other large towns do not lead to the conclusion that sewer gas has in any way increased the prevalance of infectious diseases. We find that whilst sewers and consequently sewer ventilators have increased to a vast extent all over the country, these diseases have considerably diminished and that this has been more particularly the case with typhoid fever, a disease which of all others has been most conclusively shown to be connected with poisoning by sewage matters. In Cardiff for instance the average death rate from this disease, which was 19 per 10,000 of the population during the 10 years 1845-54, was reduced to 3 per 10,000 during the 10 years 1874-83. In the Registrar General's last report for the year 1894, we find that in Cardiff, with a population of 148,890, there were seven deaths from typhoid fever, while in the rest of South Wales with a population of 961,311 there were 175 deaths from this disease, giving a death rate per million persons of 40 for Cardiff, and 182 for the rest of South Wales.

The death rate from typhoid fever per 10,000 of the population during successive years since 1887, has been as follows in Cardiff as compared with the average in the 33 large towns of England and Wales :—

DEATH RATE PER 10,000.

Years	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.
Cardiff	3·3	2·5	1·9	1·9	1·9	1·2	0·4	0·8
Large Towns	2·0	2·0	1·9	2·0	1·5	2·4	1·9	2·0

In the face of these figures it does not seem probable that emanations from sewers can be held responsible for an increase of typhoid fever in Cardiff or in the large Urban Districts of England and Wales.

In the same way we find of late years a marked diminution in the general mortality and in the mortality from the group of zymotic diseases in the large towns in which there are for the most part sewers and sewer ventilators in the streets. The following table gives the average annual deaths from all causes to 1,000 persons living in large Urban Districts, in decennial periods :—

1851-60.	1861-70.	1871-80.	1881-90.
24·7	24·8	23·1	20·3

In Cardiff the decrease in the general mortality has been still more marked, as will be seen by the following :—

1845-54.	1855-64.	1865-74.	1875-84.	1885-94.
32·7	26·7	23·6	20·0	20·7

whilst the average death rate for the four years 1892-95 was 18·1 per 1,000 persons.

The average annual death rate from the group of zymotic diseases has decreased in Cardiff from 9 8 per 1,000 during the ten years 1845-54 to 2·7 during the ten years 1885-94.

There is however one disease amongst the group of zymotics which has not responded to our efforts at sanitary reform. Diphtheria, which was formerly relatively more prevalent in rural than in urban districts, has of late years shown a tendency to increase in large cities and towns. For instance in London the annual rate per million of the population has increased from 122 in the ten years 1871-80, to 259 in 1881-90, and since then the rate has been as follows :—

Years	1891.	1892.	1893.	1894.	1895.
Death rate per 1,000,000	340	462	760	625	529

In Cardiff the average death-rate from this disease was 180 per million during the six years 1878-83. This rate has increased to 208 during the six years 1884-89, since then the rate has been as follows :—

Years	1890.	1891.	1892.	1893.	1894.	1895.
Death rate per 1,000,000	128	122	264	653	396	295

This increase, which has taken place chiefly in the large centres of population where sanitary reforms have been most actively carried out, seems to indicate that that the development and spread of diphtheria is not very closely connected with sanitary defects, and that the improvements which have had such a marked effect upon other infectious diseases have done little towards stamping out diphtheria. Considerable difference of opinion exists amongst authorities as to the nature and extent of the influence exerted by insanitary surroundings in the spread of diphtheria.

I have in several reports expressed the opinion that owing to the extreme infectiousness of the disease, the aggregation of large numbers of children in schools is probably the most active agent in the spread of this disease. At the same time there can be no doubt that insanitary conditions and especially defects in drainage are at times responsible either directly or indirectly for the development of diphtheria. In the face of recent investigations which show the comparative freedom from microbes of sewer air, it does not seem probable that diphtheria can often be directly produced by inhaling such air. It is however very probable that a non-specific sore throat may be produced by the foul emanations from sewers, and that this non-specific inflammation of the tonsils and mucous surfaces of the throat may take on diphtheritic action under certain conditions, the most favourable condition being of course close contact with a person suffering from diphtheria. It is in such cases that school attendance plays an active part in the spread of the disease, by bringing together in the large public elementary schools large numbers of young children, amongst whom some may be suffering from a mild and unnoticed sore throat which may develope into true diphtheria.

In comparing the vital statistics of towns differently situated with respect to the methods of sewer ventilation, no indication is found of any influence either for good or for evil on the health of the inhabitants of any particular method of sewer ventilation. The death rate of Bristol in which city the sewers are unventilated is as favourable as that of Brighton, where the most extensive system of sewer ventilation prevails. It is probable that in Bristol the gradients and flushing arrangements of the sewers are such as to produce a constant and rapid flow of the sewage, and in such cases it would seem that sewer ventilation may be abandoned without any evil consequences. In Cardiff however this condition cannot be always obtained, as the low-lying nature of the ground seriously interferes with the velocity of flow in some of the sewers, especially in times of unusual drought when the ordinary flushing of them is of necessity suspended.

In the foregoing report I have endeavoured to lay before you the chief points connected with sewer ventilation in so far as they relate to the medical and sanitary aspect of the question, and have indicated what in my opinion is the nature of the influence which sewer air has upon the public health. I have also obtained and tabulated certain information from other towns which I trust may be of service to you in the consideration of this matter. I have only to repeat that it is entirely the province of Engineers to design sewers in such a way and to maintain them in such a condition that they will be self-cleansing and free from the deposit of anything which will cause an offensive or dangerous smell. It is also their province to advise upon the exact method of ventilation which should be carried out.

There are however certain measures of domestic sanitation upon which it is the duty of the Medical Officer of Health to advise, and which are closely connected with the condition of the public sewers. I consider that it is absolutely essential that in the construction of new houses provision should be made for the disconnection of house drains from the public sewer in the manner which I have already indicated, and that where possible this disconnection should be provided in old houses. Further, that in new houses all water closets should be provided with a suitable waste preventing flushing tank. If these measures were universally adopted it would be practically impossible for sewer air to obtain ingress into houses, and the cleansing of public sewers would be greatly facilitated by the regular flushing of the house drains.

I have the honour to be, Gentlemen,

Your obedient Servant,

EDWARD WALFORD,

Medical Officer of Health.

SEWER VENTILATION.—Replies to Inquiries.

TOWN.	Population.	System of Ventilation.	Is the system approved of by the Medical Officer of Health?	Has Medical Officer reason to connect Illness with the system?	Are complaints of Nuisance numerous?
OXFORD	45,712	Ventilators opening at street level and pipes carried above house windows	Does not approve of road ventilators	Has had cause to suspect illness	Yes
LEEDS	402,449	In new sewers by ventilators in centre of street. In others by untrapped gullies at side of street	Not altogether	Not been able to connect illness with system	Yes
PRESTON	113,864	By 9in. pipes opening in centre of street	Consider it to be the best in use	No	Complaints occasionally received
SCARBOROUGH	33,776	By 9in. shafts carried above buildings	Yes if in sufficient numbers	No	No
NORTHAMPTON	61,012	By ventilators in centre of street	No	Suspects that illness is occasionally caused	Yes, in warm weather
BOURNEMOUTH	37,785	By standard (5in. to 9in. diameter) cast iron pipes 30ft. to 80ft. in height	Yes	No	No
BATH	51,844	By 6in. iron shafts about 30ft. high in higher levels	Yes	No	No
CARLISLE	39,176	By ventilating manholes in centre of street, and by shafts carried up factory chimneys	Not as regards street ventilators	No evidence of illness	Yes, from manholes
WORCESTER	42,908	By road grids chiefly, a few shafts carried above houses	Not in small streets	No proof of illness	Yes
SUNDERLAND	140,386	Ventilators opening at street level. Many of them close to windows and doors, and to footpaths	Not as carried out in Sunderland	Considers that illness is caused by ventilation	Yes
READING	60,054	Ventilators opening at street level	Yes	No	Few
EASTBOURNE	34,969	Ventilators opening at street level and high columns	Does not approve of the number of road ventilators in proportion to the number of columns	No	Yes
SOUTHAMPTON	82,126	Ventilators opening at street level	No	In few cases	Yes, in dry weather
WARRINGTON	52,743	Ventilating manholes in surface of streets	Considers it the best in use	Sometimes had reason to connect illness with system	Occasionally
GLOUCESTER	39,444	Ventilating manholes in surface of streets, and by shafts carried above houses	Yes if plenty of shafts are provided	No	Yes
EXETER	37,404	Ventilators opening at street level in new sewers, and by shafts carried above houses in old sewers	Not altogether	No	No
YORK	67,841	Ventilators opening at street level. Most of old sewers unventilated	Yes	No	Nuisance has occasionally been caused by obstruction in sewer
CHESTER	37,105	Ventilators opening at street level, supplemented by high shafts where possible	Yes	No	Not very
HULL	220,844	Ventilating manholes at surface of street	Yes	No	No
CROYDON	118,006	Ventilators opening at surface of street, and by a few high shafts	Yes	No	No
NEWCASTLE-UPON-TYNE	212,223	Ventilators opening at surface of street	Not unreservedly	Has occasionally had reason to suspect so	Yes in certain localities
BURNLEY	102,805	Ventilators opening at street level, and rain water pipes	No	Yes	Yes
MANCHESTER	529,561	Ventilators opening at street level with a few high shafts	Yes, conditionally	No	No
LIVERPOOL	632,512	Ventilators opening at street level with a few high shafts	Yes	No	No
SALFORD	210,707	Ventilating manholes at street level. High shafts in narrow passages	No reply	No	Yes
LEICESTER	198,659	Ventilators opening at street level and high shafts.	Of shafts	Yes	No
WOLVERHAMPTON ...	86,530	Ventilators opening at street level, with high shafts in narrow streets	Yes, conditionally	Not definitely	No
BOLTON	120,380	Ventilating manholes at street level and pipe shafts in centre of street, except in narrow streets, where shafts are carried up above buildings	Approve of Shafts	Has reason to connect illness with manholes	Yes, of manholes
NOTTINGHAM	229,775	Re-placing street ventilators by high shafts	Yes	No	Yes
BRADFORD	228,809	Ventilators opening at street level	Yes	No	In particular districts
OLDHAM	143,442	Ventilators opening at street level in centre of street, and by untrapped grids at side of street, and by rain water pipes	Not the last feature	No	No
BIRKENHEAD	109,343	Ventilators opening at street level	No	Suspects that illness is caused	Yes
BIRMINGHAM	501,241	Chiefly by ventilators opening at street level	Yes	No	Rather numerous but
HALIFAX	94,775	Ventilators opening at street level	Yes	No	No
PLYMOUTH	90,276	Ventilators opening at street level and a few high shafts	Not altogether	In a few isolated cases	Yes
BRISTOL	230,623	Sewers not ventilated	Approves of the absence of ventilators	No	
SHEFFIELD	347,278	Ventilators at street level	Yes, if sewers are in good condition	No	Yes, in dry weather
SWANSEA	98,645	Ventilators opening at street level and a few high shafts	Yes	Yes, in a few instances	Occasional
IPSWICH...	57,433	Ventilators opening at street level and high shafts	Approves of the high shafts	Illness has been attributed to road ventilators	Not so many as formerly